National Climatic Data Center

DATA DOCUMENTATION

FOR

DATA SET 6141B (DSI-6141B)
NCEP Model Output - FNL ARCHIVE DATA

December 6, 2002

National Climatic Data Center
151 Patton Ave.
Asheville, NC 28801-5001 USA

:

Table of Contents

.

:
:   2:

1.   **Abstract**: The National Weather Service's National Centers for Environmental Prediction (NCEP) runs a series of computer analyses and forecasts operationally. One of the operational systems is the Global Data Assimilation System (GDAS, Kanamitsu, 1989), which uses the spectral Medium Range Forecast model (MRF) for the forecast. Another system is the Eta Data Assimilation System (EDAS), covering the U.S.

At NOAA's Air Resources Laboratory (ARL), NCEP model output is used for air quality transport and dispersion modeling. ARL archives both EDAS and GDAS data using a 1-byte packing method. Both archives contain basic fields such as the u- and v-wind components, temperature, and humidity. However, the archives differ from each other because of the horizontal and vertical resolution, as well as in the specific fields, provided by NCEP.

The archive data file contains the data in synoptic time sequence, without any missing records (missing data will be represented by nulls and the forecast hour by negative 1). Therefore it is possible to position randomly to any point within a data file. Each file contains data on one hemisphere for approximately half a month: days one through 15, and 16 through the end of the month. At each time period, an index record and surface data come first, followed by all data in each mandatory pressure level from the ground up.

Data Grid

The data are on hemispheric 129 by 129 polar stereographic grids. In Table 1 each data grid is identified by the model that produced the data, a grid identification number, the number of X and Y grid points, the grid spacing (Delta) which is true at the indicated latitude, the longitude to which the Y axis is aligned, and the pole position in grid units. The given pole position results in the lowest left grid point to have a value of (1,1). The northern and southern hemisphere grids have ID #12 and #13, respectively.

```
         -----------------------------------------------------------------
                   Table 1. Data Grid Specifications
         -----------------------------------------------------------------
         Model     ID   X     Y     Delta      True Align    X      Y
         Type      #    Max   Max   Km         Lat. Lon.    Pole   Pole
         -----------------------------------------------------------------
         FNL       12   129   129   190.5      60N   80W    65.0    65.0
         FNL       13   129   129   190.5      60S  100E    65.0    65.0
```

ORIGIN OF THE DATA

The 6-hourly archive data come from NCEP's GDAS. The GDAS is the final run in the series of NCEP operational model runs; it therefore is known as the Final Run at NCEP and includes late arriving conventional and satellite data. It is run 4 times a day, ie, at 00, 06, 12, and 18 UTC. Model output is for the analysis time and a 6-hour forecast. Some fields such as precipitation and surface fluxes are only available at the forecast time. Details of the GDAS are described by Kanamitsu (1989), Derber et al. (1991), and Parrish and Derber (1992).

NCEP post-processing of the GDAS converts the data from spectral coefficient form to 1 degree latitude-longitude (360 by 181) grids and from sigma levels to mandatory pressure levels. The data are written to the NIC (NOAA Information Center) FTP server (nic.fb4.noaa.gov) in GRIB (GRIdded Binary) format.
:
:
:

ARL PROCESSING

The ARL archiving program converts data from the 1-degree latitude-longitude grid to hemispheric 129 by 129 polar stereographic grids. Model output from both the analysis and 6-hr forecast are written to the archive file, so as to include the fields only available in the forecast period, and to enable the short-term forecast data to "fill-in" for a missing period if model output from any single NCEP run is not available. These archived data are referred to as the "FNL archive."

For additional information, please see the ARL archive reference page:

http://www.arl.noaa.gov/ss/transport/archives.html

2. **Element Names and Definitions**:

Meteorological Fields and Vertical Structure

The archived data file only contains some of the fields normally produced by the model at NCEP. These were selected according to what is most relevant for transport and dispersion studies and disk space limitations. In Table 2, the fields are identified by a description, the units, and a unique four character identification label that is written to the header label (see Data Grid Unpacking Procedure in a later section) of each record. Data order in the file is given by a two digit code. The first digit indicates if it is a surface (or single) level variable (S) or an upper level variable (U). The second digit indicates the order in which that variable appears in the file. The upper level FNL data are output on the following mandatory pressure surfaces: 1000, 925, 850, 700, 500, 400, 300, 250, 200, 150, 100, 50, and 20 hPa. Table 3 gives the level number, corresponding to each data level, which is also written to each header label.

Table 2. Meteorological Fields for FNL Archive Data.

Field	Units	Label	Data Order
Pressure at surface	hPa	PRSS	S1
Pressure reduced to mean sea level	hPa	MSLP	S2
Temperature at surface	K	TMPS	S3
Total precipitation (6 h accumulation)	m	TPP6	S4
Momentum flux, u-component at surface	N/m2	UMOF	S5@
Momentum flux, v-component at surface	N/m2	VMOF	S6@
Sensible heat net flux at surface	W/m2	SHTF	S7@
Latent heat net flux at surface	W/m2	LHTF	S8@
Downward short wave radiation flux at surface	W/m2	DSWF	S9@
Temperature at 2 m AGL	K	T02M	S10
Relative humidity at 2 m AGL	%	RH2M	S11
U-component of wind at 10 m AGL	m/s	U10M	S12
V-component of wind at 10 m AGL	m/s	V10M	S13
Volumetric soil moisture content of layer 0-10 cm below ground	fraction	SOLW	S14
Total cloud cover, entire atmosphere	%	TCLD	S15@

:
:   4:
:

```
U-component of wind with respect to grid  m/s       UWND      U1
V-component of wind with respect to grid  m/s       VWND      U2
Geopotential height                       gpm*       HGTS      U3
Temperature                               K          TEMP      U4
Pressure vertical velocity                hPa/s      WWND      U5**
Relative humidity                         %          RELH      U6***
-----------------------------------------------------------------------
@ 6-hour average
* geopotential meters
** Vertical velocity available only through 100 hPa.
*** Relative humidity available only through 300 hPa.


    -----------------------------------------------------------------------
          Table 3. Description of Vertical Levels
    -----------------------------------------------------------------------
             Level      Height
    -----------------------------------------------------------------------
              13      20 hPa
              12      50 hPa
              11     100 hPa
              10     150 hPa
               9     200 hPa
               8     250 hPa
               7     300 hPa
               6     400 hPa
               5     500 hPa
               4     700 hPa
               3     850 hPa
               2     925 hPa
               1    1000 hPa
               0     surface
```

3.   **Start Date**: 19970101. Global data for the period 1991 – 1996 are called the MRF Archive and are also available from NCDC (DSI-6140).

4.   **Stop Date**: Ongoing.

5.   **Coverage**: Global

    a. Southernmost Latitude: 90S
    b. Northernmost Latitude: 90N
    c. Westernmost Longitude: 180W
    d. Easternmost Longitude: 180E

6.   **How to Order Data**:

Ask NCDC's Climate Services about the cost of obtaining this data set.
Phone: 828-271-4800
FAX: 828-271-4876
E-mail: **NCDC.Orders@noaa.gov**

7.   **Archiving Data Center**:

National Climatic Data Center
Federal Building
151 Patton Avenue

:
:   5:
:

```
            Asheville, NC  28801-5001
            Phone: (828) 271-4800.
```

8.   Technical Contact:

```
       National Climatic Data Center
       Federal Building
       151 Patton Avenue
       Asheville, NC  28801-5001
       Phone: (828) 271-4800.

       NOAA-Air Resources Laboratory
       1315 East-West Highway
       Silver Spring, MD 20910
       (301-713-0295)
```

9.   Known Uncorrected Problems: None.

10.   Quality Statement: No information provided with original documentation.

11.   Essential Companion Datasets: None.

12.   References:

Derber J.C., D.F. Parrish, and S.J. Lord, 1991: The new global operational analysis system at the National Meteorological Center, Weather and Forecasting, 6, (538-547).

Kanamitsu, M., 1989: Description of the NMC Global Data Assimilation and Forecast System, Weather and Forecasting, 4 (335-342).

Parrish, D.F. and J.C. Derber, 1992: The National Meteorological Center's spectral statistical interpolation analysis system. Mon. Wea. Rev. 120 (1747-1766).

Petersen, R.A. and J.D. Stackpole, 1989: Overview of the NMC Production Suite, Weather and Forecasting, 4 (313-322).

Sela, J.G., 1980: Spectral modeling at the National Meteorological Center, Mon. Wea. Rev., 108 (1279-1292).